

SUB A1

1. An early suppression fast response pendent-type fire protection sprinkler suitable for use in accordance with one or more of NFPA 13, NFPA 231 and NFPA 231C to protect single row rack storage, double row rack storage and multiple row rack storage, said sprinkler having a K-factor of about 25 and a flowing pressure of about 15 pounds per square inch.

SUB A3

2. The early suppression fast response pendent-type fire protection sprinkler of claim 1, further comprising:
a sprinkler body defining an orifice and an outlet for delivering a flow of fluid from a source, and
a deflector mounted with a first surface opposed to flow of fluid from the outlet, said deflector defining at least two reentrant slots disposed in opposition about a deflector axis, said reentrant slots extending from said first surface through said deflector, and said reentrant slots extending from slot openings at an outer peripheral edge of said deflector inwardly from said peripheral edge toward said deflector axis.

SUB A4

3. The early suppression fast response pendent-type fire protection sprinkler of claim 2, wherein said reentrant slots extend inwardly along reentrant slot centerlines, and each of said reentrant slots has a first width transverse to its reentrant slot centerline in a region of said peripheral edge and a second slot width transverse to its reentrant slot centerline in a region spaced inwardly, toward said deflector axis, relative to the region of said peripheral edge, said second width being greater than said first width.

4. The early suppression fast response pendent-type fire protection sprinkler of claim 3, further comprising an

3 apex element and wherein said deflector is mounted to said
4 apex element and wherein an innermost portion of each of
5 said reentrant slots extends inwardly toward said deflector
6 axis to be no further outward from said deflector axis than
7 an outermost surface of said apex element.

1 5. The early suppression fast response pendent-type
2 fire protection sprinkler of claim 4, wherein said innermost
3 portions of said reentrant slots extend inwardly toward said
4 deflector axis to underlie said apex element, relative to
5 fluid flow direction from said outlet.

1 6. The early suppression fast response pendent-type
2 fire protection sprinkler of claim 3, wherein said reentrant
3 slot centerlines extends radially outward from said
4 deflector axis.

1 7. The early suppression fast response pendent-type
2 fire protection sprinkler of claim 1, wherein said sprinkler
3 is suited for installation up to 18 inches below a ceiling.

1 8. The early suppression fast response pendent-type
2 fire protection sprinkler of claim 1, wherein said deflector
3 has a thickness measured from said first surface in the
4 direction of fluid flow equal to or greater than about 0.06
5 inch

1 9. The early suppression fast response pendent-type
2 fire protection sprinkler of claim 2, wherein said reentrant
3 slots comprise a plurality of reentrant slots, said
4 plurality of reentrant slots comprising at least a first
5 type of reentrant slots and a second type of reentrant
6 slots,

7 reentrant slots of said first type extending from
8 said first surface through said deflector with the slot
9 openings at an outer peripheral edge of said deflector body,
10 each of said reentrant slots of said first type extending
11 inwardly from said peripheral edge, along the reentrant slot
12 centerlines, generally toward said deflector axis, to a
13 first type length,

14 reentrant slots of said second type extending
15 through said deflector from said first surface, with the
16 slot openings at said peripheral edge of said deflector
17 body, each of said reentrant slots of said second type
18 extending inwardly from said peripheral edge, along the
19 reentrant slot centerlines, generally toward said deflector
20 axis, to a second type length, and

21 the innermost portions of said reentrant slots of
22 said first type extending inwardly toward said deflector
23 axis to be no further outward from said deflector axis than
24 the outermost surface of said apex element.

1 10. The early suppression fast response pendent-
2 type fire protection sprinkler of claim 9, wherein:

3 each of said reentrant slots of said first type has
4 a first width transverse to its slot centerline in a region
5 of said peripheral edge and a second width transverse to its
6 slot centerline in a region spaced inwardly, toward said
7 deflector axis, relative to the region of said peripheral
8 edge, the second said width of said first type slots being
9 greater than the first said width of said first type slots,
10 and

11 each of said reentrant slots of said second type has
12 a first width transverse to its slot centerline in a region
13 of said peripheral edge and a second width transverse to its
14 slot centerline in a region spaced inwardly, toward said

15 deflector axis, relative to the region of said peripheral
16 edge, the second said width of said second type slots being
17 greater than the first said width of said second type slots.

1 11. The early suppression fast response pendent-
2 type fire protection sprinkler of claim 9, wherein said
3 first type length is equal to or greater than said second
4 type length.

1 12. The early suppression fast response pendent-
2 type fire protection sprinkler of claim 11, wherein said
3 reentrant slot centerlines of said reentrant slots of said
4 first type extend substantially radially outward from said
5 deflector axis.

1 13. The early suppression fast response pendent-
2 type fire protection sprinkler of claim 12, wherein said
3 reentrant slot centerlines of said reentrant slots of said
4 second type extend substantially radially outward from said
5 deflector axis.

1 14. The early suppression fast response pendent-
2 type fire protection sprinkler of claim 9, wherein said
3 reentrant slots of said first type comprise at least two
4 pairs of generally opposing reentrant slots.

1 15. The early suppression fast response pendent-
2 type fire protection sprinkler of claim 9, wherein said
3 reentrant slots of said second type comprise at least two
4 pairs of generally opposing reentrant slots.

1 16. The early suppression fast response pendent-
2 type fire protection sprinkler of claim 9, wherein said

3 first type length of said reentrant slots of said first type
4 is substantially the same.

1 17. The early suppression fast response pendent-
2 type fire protection sprinkler of claim 9, wherein said
3 second type length of said reentrant slots of said second
4 type is substantially the same.

1 18. The early suppression fast response pendent-
2 type fire protection sprinkler of claim 9, wherein said
3 reentrant slots of said first type define reentrant portions
4 having an elongated shape.

1 19. The early suppression fast response pendent-
2 type fire protection sprinkler of claim 9, wherein said
3 reentrant slots of said second type define reentrant
4 portions having a pear-shape.

1 20. The early suppression fast response pendent-
2 type fire protection sprinkler of claim 9, wherein a
3 reentrant slot of said second type is located between
4 reentrant slots of said first type.

543 1 21. An early suppression fast response pendent-type
2 fire protection sprinkler suitable for use in accordance
3 with one or more of NFPA 13, NFPA 231 and NFPA 231C to
4 protect single row rack storage, double row rack storage and
5 multiple row rack storage, said sprinkler having a K-factor
6 of about 25 or more and a flowing pressure of about 15
7 pounds per square inch.